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December 22, 2021

Cindy L. Dionne
Division of Water Quality Management
Maine Department of Environmental Protection
17 State House Station
Augusta, ME 04333-0017

Re: TNC Comments on American Aquafarm Discharge Permit Application(s) for the Long Porcupine and Bald Rock Sites - Frenchman Bay, Maine

Dear Ms. Dionne:

Please accept The Nature Conservancy in Maine's comments on the American Aquafarm Discharge Permit application for two sites in Frenchman Bay, Maine – Long Porcupine (Site FB 01) and Bald Rock (Site FB 02).

The Nature Conservancy (TNC) is a nonprofit conservation organization dedicated to conserving the lands and waters on which all life depends. Guided by science, we create innovative, on-the-ground solutions to our world's toughest challenges so that nature and people can thrive together. Working in more than 70 countries, we use a collaborative approach that engages local communities, governments, the private sector, and other partners. The Nature Conservancy has been leading conservation in Maine for more than 60 years and is the 12th largest landowner in the state, owning and managing roughly 275,000 acres. We also work across Maine to restore rivers and streams, partner with fishermen in the Gulf of Maine to rebuild groundfish populations, and develop innovative solutions to address climate change.

TNC recognizes that, when done in the right way and in the right places, commercial aquaculture can provide sustainable seafood to help meet the needs of a growing global population while also providing good paying jobs. As with any commercial food production system, there are tradeoffs and risks associated with aquaculture that must be carefully considered. When considering open ocean net pen aquaculture, these risks include water quality and benthic habitat degradation, eutrophication, disease, and fish escapes which can affect genetic fitness and habitat availability for native stocks.

In general, TNC seeks to ensure that aquaculture projects of all types are sited and operated in a responsible, sustainable manner. Given the scope, scale, and location of the project proposed by American Aquafarm in Frenchman Bay, its proposed deployment of net-pen technology that has never been used in Maine or the United States, and the potential risks the project poses to the significant investments TNC has made to restore sea-run fish and groundfish in the Gulf of Maine, we have reviewed the discharge permit application and supporting materials carefully. We have identified several shortcomings in the permit application and request that the Department require the applicant to correct them and to more substantively address the myriad potential adverse environment impacts associated with the proposed project.

Characterization as a “closed pen” system is misleading

TNC is concerned that the applicant routinely characterized the proposed technology as a “closed-pen” system in the discharge permit application and in other public documents. For example, the Net Pen Description included in the Supplemental Information for the Discharge Permit Application states, “The Eco-pen from American Aquafarms is a floating, closed containment aquaculture production system” and that “production of Atlantic salmon in closed pens offers advantages in terms of waste management as the technology allows for the collection of settleable solids”. We appreciate that the applicant is proposing to use a novel net-pen technology designed to reduce discharges of particulate matter from the site and minimize impacts to the receiving waters.

However, TNC is concerned that characterizing the proposed net-pen technology as a “closed-pen” system is inaccurate and can potentially mislead decision-makers and the general public about the nature of the project and its’ associated impacts. The discharge permit application describes how, at full production, the project will discharge billions of gallons of degraded water and thousands of pounds of nitrogen per day while also potentially releasing million pounds of fish waste and uneaten fish feed per year. Given the scope and scale of the proposed discharges, we believe it is inappropriate for the applicant to characterize the technology as a “closed pen” system. While we recognize it may not be within the Department’s regulatory purview to dictate how the applicant characterizes the project, we believe the project is more accurately characterized as a semi-closed containment system and should be described as such publicly.

Proposed technology unproven at a project of this scale

The applicant proposes to use a novel, semi-closed containment system for the net pens used on the project. In the discharge permit supporting materials, the applicant states that there are many closed pen operations in Norway that are currently operating and that the “operation will use state of the art rearing technology to implement know-how from partners and personnel, design solutions from the Norwegian salmon industry.” We appreciate that these systems are intended to minimize/eliminate sea lice infestations and to maximize the amount of settleable solids that can be captured in order to minimize impacts to the marine environment surrounding the net pens. At the same time, we are concerned that this technology has never been used for a project of this scale in the United States; as such, there are no state or federally promulgated best practicable treatment standards for semi-closed aquaculture pens.

The Conservancy recognizes that the environmental impacts of the project will be largely controlled by the efficacy of the proposed net pen technology and water treatment systems and their ability perform as expected. Given the magnitude of proposed discharges from the operation (described below) and their potential to significantly degrade the quality of the receiving waters, TNC urges the Maine DEP to carefully review and consider the ecosystem level impacts that could arise from the following:

- The applicant proposes to discharge upwards of 2.05 billion gallons per day of degraded water containing dissolved nutrients (carbon dioxide, ammonia, and phosphate) from the net pens at each site (Bald Rock and Long Porcupine). (Ransom p. 2)
- The applicant proposes to discharge over 351,000 gallons per day of wastewater from the sludge dewatering systems that will contain elevated concentrations of dissolved nutrients including nitrogen, phosphorous, organic carbon, and ammonia. (Ransom p. 14)
- The applicant proposes to discharge over 2,300 pounds of nitrogen per day (1984 lbs/day from pens and 354 lbs/day from dewatering facility) at both the Bald Rock and Long Porcupine sites. (Ransom memo p. 18)
- The applicant proposes to use nearly 2.5 million pounds per month of fish feed at both the Bald Rock and Long Porcupine sites. Up to 10 percent of the particulate solids within the pens (uneaten feed

pellets and fecal matter) will not settle out and will be discharged (attach 3 p. 3, 7). Average monthly feed rates of nearly 5 million pounds across two sites. (2.48 million pounds per site). (p.7)

Discharges of this magnitude pose significant environmental risks to Frenchman Bay including, nutrient loading, increased levels of Total Suspended Solids, and dissolved oxygen reductions caused by eutrophication even if the proposed net pens and wastewater treatment system perform as expected.

Given the scope and scale of the project, the significant ecological risks it poses, the proposal to use novel net-pen technology, TNC believes it is imperative that the applicant make an affirmative showing that the proposed net pens and treatment system are capable of performing as predicted. While the applicant makes several references to experience with semi-closed containment systems in Norway and states that this is not the largest (semi) closed pen aquaculture facility in terms of acreage or potential environmental impacts, we were unable to find any specific examples of projects using the technology in a project with similar stocking densities, feed rates, and water usage as the Frenchman Bay proposal. Our review of scholarly articles on the topic revealed several studies evaluating the efficacy of the proposed technology for growing out post-smolts to be subsequently transferred to open pen systems for grow-out to commercial size:

- One approach has focused on production of larger and more robust smolts and post-smolts in closed (CCS) or semi-closed (S-CCS) containment system prior to transfer to open sea cages where the salmon grow until market size.¹
- One study evaluated welfare and performance of Atlantic Salmon post-smolts during exposure to mild chronic stress in closed-containment systems.²
- One study described how new aquaculture production systems are evolving for prolonged production of Atlantic salmon smolts or post-smolts before stocking in traditional net pens, such as semi-closed containment systems (S-CCS) in sea and recirculating aquaculture systems (RAS) on land.³

In the literature review, we were able to find only one example in North America where semi-closed containment systems were tested to grow salmon to market size. This CERMAQ project, located in Clayoquot Sounds, BC experienced water quality problems and a significant die-off after only a few months of operation. In response, representatives from CERMAQ issued a statement noting the immaturity of the technology and the risks associated with using immature technology.

“SCCS is immature technology under development, therefore it is not surprising when you are trialing new technology you will run into challenges,” said Peter McKenzie, CERMAQ director of fish health, in a news release. “This was our first attempt to grow fish of varying sizes in a semi closed environment and unfortunately, due to water quality issues, fish performance was affected and resulted in fish mortality.”⁴

Given these experiences, we believe it is critically important for the Department to request additional information and references to specific projects from the applicant in order to meaningfully evaluate the ability of the proposed net pen technology to perform as predicted and ensure adverse impacts to receiving waters are minimized.

¹ Balseiro P, Moe , Gamlem I, et al. Comparison between Atlantic salmon *Salmo salar* post-smolts reared in open sea cages and in the Preline raceway semiclosed containment aquaculture system. *J Fish Biol.* 2018;93: 567–579.

² J. Kolarevic*¹ , L. Sveen² , T.O. Nilsen³ , H.Sundh⁴ , J. Aerts^{5, 6} , K. Sundell⁴ , L.O.E. Ebbesson³ , S. Handeland³ , S.M. Jørgensen² , H.Takle⁷ and B.F. Terjesen¹

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⁴ <https://www.campbellrivermirror.com/news/cermaq-halts-semi-closed-containment-system-trial/>

Baseline water quality and circulation characterization is insufficient

TNC is especially concerned about the inadequacy of water quality sampling and circulation modelling provided in the discharge permit application. We believe a comprehensive baseline assessment is critical for characterizing the site and evaluating potential impacts of the proposed discharges. Circulation patterns and water column stratification along temperature and salinity gradients within Frenchman Bay will have a direct effect on dilution of effluent from the project and impacts on receiving waters. Moreover, baseline characterization of ambient water quality will be essential for determining the assimilative capacity of the receiving waters and non-degradation determinations.

According to the permit application, physical conditions in the ambient environment were characterized based upon in-situ observations made during the summer and fall of 2020. Observations include vertical profiles of conductivity and temperature used to estimate seasonal density stratification of the water column as well as Acoustic Doppler Current Field Profiler observations used to characterize the current velocity at the site. Representative seasonal density profiles for summer stratified conditions and winter unstratified conditions are based on monthly water quality monitoring data collected July through October 2020 and described in the March 3, 2020 report. (Ransom memo p.1)

Baseline Water Quality

Our understanding of the information presented in the permit application indicates that water quality data was collected over an abbreviated four-month period in 2021, with one day of sampling completed in each of four months (July 22, 2020, August 20, 2020, September 24, 2020, and October 21, 2020). Water quality parameters were analyzed from samples collected from three separate depths at four locations, for a total of 12 samples per lease site. We do not believe this level of sampling is sufficient to adequately characterize baseline water quality conditions and circulation within Frenchman Bay.

For example, review of the Secchi disc measurements show a wide range of conditions among the four samples within the sampling period which infers this is a dynamic system. With so few samples the standard deviations of the data will be so wide as to give little confidence of actual water quality conditions. Moreover, the applicant only describes dissolved oxygen in narrative terms (e.g. 'meets SB classification criteria >85%). We found no discussion that described whether dissolved oxygen measurements taken at multiple depths or if the instrument allowed to record over diurnal, nocturnal or tidal cycles to determine how closely dissolved oxygen criteria are attained. This especially important given that the proposed site is near SA waters around Bar Harbor where the water quality standard is "as naturally occurs" (i.e. no measurable change).

Given the critical need to accurately characterize baseline water quality conditions at In Frenchman Bay in order to meaningfully evaluate the project and associated impacts, we recommend that a more comprehensive program with monthly sampling over the course of a year (at a minimum) be completed.

Baseline Circulation Patterns

We are also concerned that the applicant has not accurately characterized circulation patterns at the proposed net-pen sites due to limited deployment of the Acoustic Doppler Current Profiler (ADCP). The permit application indicates that far-field dilution for the proposed discharges can be estimated as the ratio of the discharge flow rate to the net tidal residual flux of ambient water that passes through the site, *based on the ADCP observation* (emphasis added). (Ransom memo p. 9). Our understanding from information presented in the discharge permit application is that the ADCP was deployed for less than one full day at the site (9/17/20). We also note that, based on lunar cycle records, the date selected to deploy the ADCP was during a new moon which generally coincides with some of largest tides and strongest currents of the monthly cycle. Spring tides characterize a 'best case' condition when water exchange is expected to be greatest. Neap tide measurements

need to be included to estimate expected near-field and far-field transport and water quality effects of the discharge. One day of ADCP information is insufficient to accurately characterize circulation in the bay and that the selection of that particular day in the lunar cycle may lead to overestimating velocity of flow and dilution capacity in the bay.

Moreover, we are concerned that there is insufficient information in the permit application to accurately characterize bay-wide circulation patterns across Frenchman Bay, a critical factor in understanding the long-term fate of pollutants discharged from the pens and dewatering facility. Our understanding is that the “far-field” dilution assessment presented in the application is only focused on the lease areas containing pens and that no information was presented to characterize broader circulation patterns and currents in Frenchman Bay or interchange with “open ocean” water from the Gulf of Maine.

Accurate and comprehensive understanding of water circulation, both “in-farm” and bay-wide will be critical for assessing potential impacts from the project, including both near and far-field dilution estimates. We urge the Department to require more extensive modelling of bay-wide circulation patterns before making a final determination on the requested permits. As part of that broader assessment, we also encourage the Department to carefully consider circulation modelling developed by Dr. Chris Kincaid of University of Rhode Island and Dr. Lauren Ross of University of Maine and presented during the public comment period.

Lack of information on potential impacts of entrainment of plankton and larval life stages in the proposed net pen system.

TNC is concerned that the discharge permit application does not provide any information on the potential impacts that entrainment of planktonic and larval life stages could have on the marine ecosystem in Frenchman Bay. Frenchman Bay is ecologically and economically important resource in the State of Maine, supporting lobster businesses, aquaculture farms, and other important fisheries. Moreover, the proposed site is immediately adjacent to juvenile cod Habitat Area of Particular Concern recommended by the New England Fisheries Management Council and designated by the National Marine Fisheries Service. The proposed semi-closed net pen system will use up to four billion gallons of water per day and, according to the discharge permit application, screens/cages will be installed around the water intake ports to prevent fish and other debris from entering. We are concerned the permit application fails to address potential impacts of entrainment of living marine organisms even though it is expected to occur. We encourage the Department to carefully evaluate the potential of planktonic and larval entrainment on the ecological health of Frenchman Bay and to require appropriate mitigation measures to address it.

Lack of information on potential discharges from the proposed fish hatchery or processing plant

We recognize that the current application is for the discharge associated with the net-pen sites and that an application for a proposed fish hatchery and processing plant has not yet been submitted. However, the hatchery operation and fish processing plant will be an integral and critical component to the proposed operation as the end product of the operation will be head-on gutted fish and fillets processed at a processing facility. As described in the permit application, the applicants preferred alternative for the hatchery and fish processing plant is the Maine Fair Trade property in Gouldsboro, ME immediately adjacent to Frenchman Bay (Application Attachment 5). Given that this site is the applicant’s preferred location, and that any associated nutrients and other fish waste will likely be discharged into Frenchman Bay, TNC encourages the Department to take a holistic view of the project and to carefully consider the potential impacts of all project-related facilities when making Non-degradation determinations and establishing effluent limitations.

Conclusion

Given the concerns described above, TNC urges the Department to require the applicant to provide additional information in order to more meaningfully evaluate the proposed project and associated environmental risks. Specifically, we believe more detail in the following areas is necessary:

- Site-specific and ecosystem level risks and impacts of the proposed discharges;
- Additional information confirming that the proposed treatment system will be able to perform; as predicted based on project-specific stocking densities, feed rates, and water usage;
- Significantly more thorough characterization of baseline water quality and circulation pattern in Frenchman Bay;
- Potential impacts of entrainment of plankton and larval life stages in the proposed net pen system; and;
- Supplemental information about discharges from the proposed fish hatchery and processing plant to provide the information the Department needs to conduct a more holistic assessment of the full range of potential environmental impacts from the of the proposed project.

Thank you for the opportunity to comment on this permit application. Please do not hesitate to contact us directly if you would like to discuss these comments in more detail.

Sincerely,



Geoffrey Smith
Marine Program Director



Kaitlyn Bernard
Natural Resource Policy Advisor

